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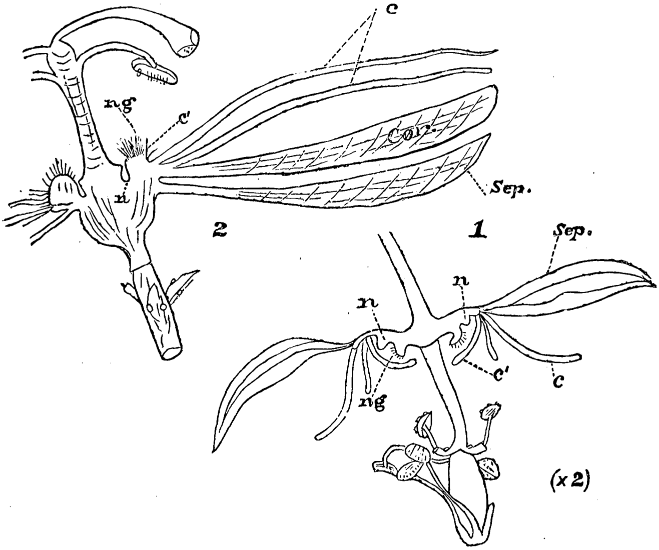
five Gastropoda, seventeen are new, and of the thirty Lamellibranchiata sixteen are new. The shells are from the Tertiary, Cretaceous and Jurassic.

BOTANY.[1]

Additional Notes on Passion Flowers.—The following notes and drawings of Passiflora, kindly furnished me by Professor Wm. Trelease, of Madison, Wis., are of interest, and should have appeared in connection with my paper on *Passiflora lutea* in the July Naturalist.—*Aug. F. Foerste, Granville, Ohio.*



Sections of passion flowers. 1.—*Passiflora gracilis*. 2.—*P. incarnata* (diagrammatic). *n*, nectar gland; *ng*, nectar guard; *c'*, inner corona; *c*, outer corona; *cor.*, corolla; *sep.*, sepals.

"*Passiflora gracilis.*—There is apparently good provision made for crossing, as nectar is secreted by the gland, but the stamens are reached by the very strongly recurved stigmas, so that close (self) pollination occurs about as soon as the flower opens. This results in fertilization, so that all flowers produce fruit. Close pollination, if it should not succeed in the above manner, is sure to occur, as the flowers close at night and so press anthers and stigmas together."[2] Bot. Gardens, Cambridge, Mass.

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[1] Edited by Prof. C. E. Bessey, Ames, Iowa.

[2] This power of self-fertilization does not exclude crossing, which is provided for in the secretion of nectar and possibly by prepotency in the pollen of other flowers, if one may reason from the cases in which this peculiarity is demonstrable. As Mr. Henslow suggests (Trans. Linn. Soc., 2d ser., Bot., 1, p. 366) the greater necessity for self-fertility [in case crossing is not effected] here than in related species is to be found in the fact that *P. gracilis* is an annual.

Passiflora incarnata.[1]—The three clavate styles radiate outward, curving downward so as to bring their bilobed brown stigmas between the anthers, though they usually stand a little higher and farther from the center of the flower. From the action of bees and wasps, nectar appears to be secreted between the inner row of short filaments, and the base of the column. Large and small bees and wasps visit these flowers and alighting on the colored corona creep in beneath the anthers and insert their tongues in the space surrounding the column or between the bases of the short filaments. In doing this they brush first stigma, then stamen; having begun thus they circle around the column, coming in contact with all the anthers in succession. Small beetles seem to prefer creeping in between the two whorls of long filaments, which they "feel" with their long mandibles. For some reason most of the flowers fail to fruit here, though the plant is wild and they are abundantly visited by bees and wasps, especially the latter. The distance between stamens and pistils and the corona is so great as to enable all but humble bees to creep about on the latter without coming in contact with the anthers or stigmas. Bees collecting pollen creep about, back downward, on the anthers, and often touch the stigmas." Dawson's Sta., Alabama.

A NEW SPECIES OF MOSS.—I send you the description of a new species of moss which has been named by Monsieur Renauld, of Tarbes, France, an eminent bryologist. In my studies of American mosses I came across two species which seemed to be undescribed. This is one of them:

Hypnum (Amblystegium) *Barberi*, Renauld, species nova.—Monoicum, dense cæspitosum. Caulis erectus 2–4 cent. longus rufo radiculosus subpinnatim ramulosus ramuli sæpe eruti fastigiati. Folia erecta, parva (½–1$^{\text{mm}}$ longa) lanceolata sensim acutata, decurrentia, ad partem inferiorem remote et *ad basin acute serrata*, apice subintegra. Costa crassa usque ad apicem continua, *dorso radiculis rufo-purpureis ornata.* Rete *subdento fere hypnoideo*, cellulæ subvermiculares obtusæ—8–12 longiores quam latæ, virides, basilares hyalinæ laxiores subhexagono-quadratæ. Flores masculi parvuli, numerosi, 4–8 antheridia. Perichætium radicans, folia externa ecostata apice recurva interna majores erecta tenuiter costata margine sinuosa. Capsula in pedicello purpureo lævi 3–4 cent. longo, suberecta, vix curvata, collo distincto instructa. Operculum convexo-conicum apiculatum et *sæpe rostellatum.* Annulus angustus *simplex.* Peristomium magnum, pallide luteum, membrana basilaris elata, processus subintegri. Cilia . . . . ?

Habitat in loco humido, provinciæ Utah, Am. bor.

The other moss, which I found in Fairmount (west park), proved to be a new variety of *Amblystegium serpens* L., which M. Renauld has called var. *Barberi.*

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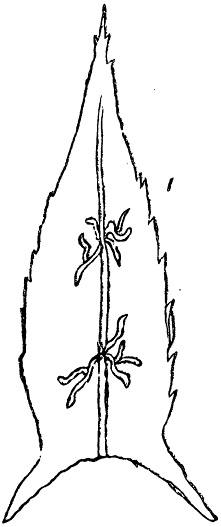
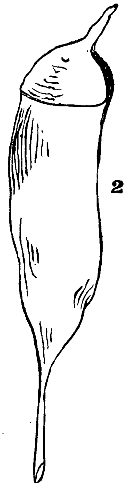
[1] AM. NAT., XIV, p. 362.



1.—Folium.



2.—Capsulum et operculum.

Specimens of the Utah species are enclosed.—*E. A. Barber, 4101 Walnut street, Philadelphia, Pa.*

The Fertilization of Pedicularis canadensis.—Although the fertilization of the genus Pedicularis has received considerable attention from European botanists, there are several points which *P. canadensis* illustrates which do not appear to have been noted. This flower is very common about Lansing, Mich., growing on high dry banks where there is but little shade. The yellow variety is about one-third more common than the purple.

The *modus operandi* of the fertilization of this species does not differ essentially from that of its English representative, *P. sylvatica*, which was described by Dr. Ogle in the *Popular Science Review* for 1870. The upper part of the tubular corolla projects forward forming a hood which contains the stamens and pistil. Lubbock[1] describes the rest in the following words: "The anthers open on their inner sides, and the edges of the open anther cells on the one side of the flower exactly correspond with and are applied to the corresponding edges of the anthers on the other side of the flower; each pair of anthers thus forming, as it were, a closed box. The outer sides of the anthers are slightly attached to the walls of the hood. But the sides of the hood are somewhat too near together to admit the head of the humble bee, and the insect, therefore, in order to reach the honey, pushes them a little apart, thus opening the anther box and letting down a little shower of pollen which is prevented from spreading by the fringe of hairs on the lower edge of the anther, and thus falls on to the head of the bee, at the very spot which a moment before had touched the stigma, and which will again touch that of the next flower she visits."

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[1] "British wild flowers in relation to insects," p. 141.

The "path-finders" of the flowers of this genus have been described by Dr. Kerner in his interesting treatise on "Flowers and their Unbidden Guests," although he makes no mention of *P. canadensis.* The inside of the lower part of the corolla is studded by numerous short, sharp bristles toward the mouth of the corolla. These form an effectual barrier against any insect passing its tongue to the nectar *via* the short route; were it not for this the fertilizing mechanism would be but seldom utilized, as the humble bees could reach the nectar without poking their heads between the sides of the hood. Ants and other undesirable visitors are excluded by long hairy trichomes pointing outward.

There is a point in the structure of the flowers of *P. canadensis* of which I find no mention as occurring in the European species. It is the curvature of the hood of the corolla; a device which materially aids the bee in reaching the nectar. Supposing a person standing with his back to the stem of the plant, the hood, in the great majority if not all cases, curves to the left. In all instances observed, the bees took advantage of this and lit upon the left.

The flowers are more largely visited by species of bumble-bees (Bombus) than any other insect. It is by them that the most of the flowers are fertilized. In one instance observed, a single bee visited one hundred and forty-four flowers in succession, and further observation convinced me that this was less than the usual number visited at one time. As the flowers are arranged spirally on the stem of the plant, the bee usually alights upon the lower flower and follows the spiral upward. In some cases a bee would come to a plant just after another had left it, but would seldom try more than one or two flowers. Finding the nectar gone from these, it seemed to realize that all on the plant had been plundered, and left for greener pasu res

The next most numerous visitors are butterflies of the family Hesperidæ, which during the later portion of the flowering season visit it freely. It is doubtful, however, to what extent they aid in fertilization, as in many cases they do not bring the fertilizing mechanism into use. The same doubt exists as to the fertilizing benefit of the humming birds which visit it to a certain extent. Probably in the case of the latter the prickly path-finders are of but little use. Besides the Hesperidæ a few *Colias philodice* were observed.

In the *Popular Science Review* for 1870, p. 41, Dr. Ogle describes the manner in which humble bees rob the flowers of the cow-wheat by biting through the calyx, and adds: "The very small calyx admits of this robbery, whereas in red rattle (*P. sylvatica*) the large leafy calyx acts as a safeguard." While this may be and doubtless is true of the English Pedicularis, it is not so of our species; notwithstanding the leafy calyx, a large number of the flowers of *P. canadensis* are bitten in just this way. Dr. W. J. Beal informs me that he has observed the same thing in *P. lanceolata.*

This species illustrates an interesting point in regard to the relative time of secretion of nectar and the opening of the flower. In most flowers it is naturally supposed that the nectar is not secreted until the corolla is about to open. Dr. Ogle has shown that this is the case in the cow-wheat. In *P. canadensis*, however, the bee and butterfly visitors habitually plunder the buds by thrusting their tongues in between the folds of the corolla. Very often they thus plunder buds in which the corolla projects less than a quarter of an inch from the calyx, at least several days before the flowers will open. They certainly would not do this did they not obtain nectar. That a certain amount of honey is also secreted after the corolla falls off is shown by the number of ants which visit the empty calyxes, as well as the occasional honey bees which visit them.—*Clarence M. Weed, Lansing, Mich.*

ENTOMOLOGY.

HABITS OF AN AQUATIC PYRALID CATERPILLAR.—The habits of the caterpillars of the Hydrocampinæ, a group of Pyralid moths, are unusually interesting, and deserve special attention in this country. We quote from Guenée the following account of them: "The principal title of the family of Hydrocampidæ to the notice of observers, resides in the habits of their caterpillars. Our three most popular entomologists, Réaumur, De Geer and Lyonnet, have observed and described them with all the details fitted for a subject so curious, and have not, so to speak, left anything for their successors to do; I will then give here a hasty analysis of their works. These caterpillars live on the leaves of several aquatic plants, Nymphæa, Potamogeton, Lemna, Stratiotes, Callitiche, etc., and as most of these plants are, in part, submerged or floating, or at least surrounded with water, it is necessary for our larvæ to have exceptional means of passing through the water, and even of living in almost constant contact with it. It is this which nature has provided, not in a uniform manner, but by varying its means with its ordinary fecundity."

The larva of Cataclysta, he says, feeds on leaves too small to enable it to be contained between them, it therefore constructs a cylindrical tube of silk, and strengthens it with leaves placed on the upper side. The case differs from that of Hydrocampa in that the tube it constructs is not like a sheath and formed of two bits of leaves, but is broadly cylindrical or oval, and strengthened all around by small leaves of Lemna. Moreover the caterpillar